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Micropeza lineata Van Duzee, new species

Length, 5-6 mm. Head, thorax, venter of abdomen, coxæ, femora and tibiæ pale yellow; front and occiput shining with the following black marks; a short median line between the eyes, a small spot around the ocelli, a line on each side, starting back of the upper inner corner of the eye and extending in an arc to the neck, where they unite forming a circle, widely separated above, and a small spot where the postvertical bristles are inserted. Occiput bulging a little back of the eyes, and extending back two-thirds the width of the eye; besides the postvertical bristles there are two more on each side placed along the black circular line. Antennæ yellow with upper edge of third joint narrowly black; a round black spot on the face below each antenna; sides of face silvery pollinose.

Dorsum of thorax with four brown lines, which are somewhat convergent in front where they unite into two and end in black spots; middle pair ending posteriorly at the suture with a black dot behind the suture at the end of each, the space between them more whitish; the lateral lines continue beyond the suture halfway to the scutellum where there is a very narrow median line between them; scutellum yellow with a black spot at base in the center and one pair of marginal bristles. Dorsum of thorax with two bristles on each side back of the suture, one near the pleural suture and one just in front of the dorsal suture; pleuræ with one bristle and several hairs below the wing, pluræ with a brown stripe, narrow at the neck, wider posteriorly, not very well defined but extending their whole length. Upper surface of first two abdominal segments blackish. Lower surface of thorax with long hairs, pale and black mixed. Hind femora with a row of black hairs on middle third of anterior surface. Tips of all tibiæ and all tarsi deep black.

Wings grayish, veins yellow; first posterior cell open; first anal cell cut off squarely at apex (not but little beyond the base of the radial sector).

Type, No. 1879, Mus. Calif. Acad. Sci., taken by E. P. Van Duzee, June 25, 1922, at **Utah Lake, Lehi, Utah.**

The abdomen of the type is injured so as to make the sex and length of body a little uncertain, but the species should be readily recognized by the characters given.

TABLE OF THE NORTH AMERICAN SPECIES OF MICROPEZA

1. Femora with brown or black rings or spots..... 2
—. Femora without brown rings or spots..... 12
2. Abdomen rufous with the hind margins of the segments yellow, sometimes the abdomen testaceous (Mexico), male of.....*stigmatica* Van der Wulp
—. Abdomen black, at least on upper surface..... 3

3. Antennæ black or partly black 4
—. Antennæ wholly reddish or yellow 7
4. Thorax unmarked (Mexico), female of ..... *incisa* Wiedemann
—. Thorax cinereous with distinct lines of brown on the dorsum 5
5. Antennæ wholly black (Mexico) ..... *nigricornis* Van der Wulp
—. Antennæ partly red or yellow 6
6. Dorsum of thorax with two median stripes and some markings on each side; pleuræ not spotted (Mexico) ..... *bilineata* Van der Wulp
—. Dorsum of thorax with three median lines; pleuræ with numerous small dots (Mexico) ..... *stigmatica* Van der Wulp
7. Dorsum of thorax brown, densely gray pollinose, with two median lines and a lateral mark on each side, which is interrupted at the suture (Lower California) ..... *flaviventris* Cole
—. Thorax without distinct vittæ 8
8. Dorsum of thorax reddish 9
—. Dorsum of thorax black 10
9. Pleuræ with a straw-yellow stripe above the coxæ; wings with a brown stripe in front (Porto Rico) ..... *limbata* Roeder
—. Pleuræ and wings without stripes (Mexico) ..... *divisa* Wiedemann
10. Uniformly black in color with some gray reflections; abdominal segments with narrow gray hind margins (Mexico) ..... *obscura* Bigot
—. Uniformly black, mesonotum with the gray pollen forming two indistinct lines (Mexico), male of ..... *incisa* Wiedemann
—. Pleuræ partly or wholly red or yellow 11
11. Pleuræ pale yellow with a bluish patch in the center (Mexico) female of ..... *incisa* Wiedemann
—. Pleuræ wholly reddish; abdominal segments with reddish hind margins; mesonotum black in the center, yellow on the sides (California) ..... *californica* new species
12. Antennæ wholly black (Arizona) ..... *turcana* Townsend
—. Antennæ partly or wholly yellow or red 13
13. Antennæ partly red or yellow, more or less black 14
—. Antennæ wholly red or yellow 15
14. Fore part of thorax with four, posterior part with three brown lines; anal cell not at all acute apically, the vein closing it nearly perpendicular with sixth vein (Utah) ..... *lineata* new species
—. Thorax black in the center of the dorsum; anal cell acute (Texas ?) ..... *turcana ambigua* Cresson
15. Front shining black with two large yellow spots before the antennæ; sternopleuræ with one brown band (Mexico) ..... *occipitalis* Van der Wulp
—. Front black with two straw yellow dots; pleuræ with two brown stripes (Mexico) ..... *pectoralis* Wiedemann

The following three North American species are not included in the table, as the characters used in the key are not all mentioned in the descriptions.

Producta Walker (Georgia, Cuba, Jamaica). First posterior cell closed in the border of the wing; femora not banded; thorax and abdomen rufous.

Bisetosa Coquillette (Arizona, New Mexico). Black mesonotum gray pollinose with four brownish vittæ; posterior margin of each abdominal segment yellow; third antennal joint yellow below; femora black with yellow base; coxæ yellow; knobs of halteres infuscated; upper part of face, cheeks, mouth parts and lower part of occiput yellow.

Ruficeps Van der Wulp (Mexico). Antennæ red; femora without dark rings or spots; first posterior cell closed in the wing margin.

A TABLE OF THE NORTH AMERICAN SPECIES OF HYDROPHORUS WITH THE DESCRIPTION OF A NEW FORM (DIPTERA)

BY M. C. VAN DUZEE
Buffalo, New York

In 1864 Doctor Loew published the first table of North American species of the genus Hydrophorus, separating the three species known to him at the time. In 1899 Doctor Wheeler's table of species of the genus appeared, containing ten species, and in 1911 Doctor Aldrich revised the genus, describing a number of new species and giving a table to the twenty-four species known to him at the time. In 1923 my table containing thirty-four forms appeared; since then eleven new species have been published, and in this paper is one more; so it seems the time has come when we need another table, that those working in the genus may more easily determine their material. The present table separates forty-eight species, all but one or two of which I have examined in my work on the genus.

Hydrophorus vandykei Van Duzee, new species

Male. Length, 2 mm.; of wing, 4 mm. Upper portion of face bright green, lower part and a narrow space above the suture thickly covered with silvery-white pollen; lower orbital cilia and beard yellow; one pair of postverticals; antennæ small, black; front opaque with brown pollen; occiput dark green, quite shining; cheeks forming a small lobe below the eye.

Dorsum of thorax metallic green, more green along the pleural suture, pleuræ and coxæ blackish; one propleural bristle above each fore coxa; two pairs of scutellar bristles; bristles on fore part of thorax small; pleuræ, coxæ, and sides of abdomen with white pollen. Abdomen short, shining bronze color; hypopygium concealed.

Fore coxæ with very small whitish hairs, four moderately long, black bristles on upper third of outer edge of anterior surface and several small ones at tip; femora and tibiæ shining green, nearly straight; fore femora thickened at base, regularly tapering to tip. Wings nearly hyaline; veins black to the root of the wing. Knobs of halteres blackish.

Type, male, No. 1880, Mus. Calif. Acad. Sci., taken by Dr. E. C. Van Dyke, June 8, 1925, at Newport, Oregon.

This would run in a table of species to *innotatus* Loew, but differs in having but four bristles on anterior coxæ, located at upper outer corner.

Table of the North American Species of Hydrophorus

1. Knobs of halteres wholly yellow 2
—. Knobs of halteres infuscated, at least on outer surface 31
2. Postvertical bristles in a row of four or more on each side 3
—. Postverticals only two, as usual 9
3. Scutellum with two or more pairs of marginal bristles 4
—. Scutellum with only one pair of marginal bristles 6
4. Wings with distinct whitish spots or clouds in the cells and at base (Manitoba) ..... *albomaculatus* Van Duzee
—. Wings without whitish spots, grayish hyaline as usual 5
5. Face nearly or quite opaque with white pollen (Western) ..... *argentatus* Van Duzee
—. Face opaque with yellow pollen (Eastern) ..... *intentus* Aldrich
6. Propleuræ with two or more black bristles above each fore coxa 7
—. Propleuræ without, or with but one black bristle above each fore coxa 8
7. Face wholly opaque with pollen (Washington) ..... *plumbeus* Aldrich
—. Face wholly shining metallic (California; Lower California) ..... *(Melanderia) curvipes* Van Duzee
8. Face and body wholly covered with yellow pollen, which is very thick in the male (Manitoba) ..... *fulvidorsum* Van Duzee
—. Pollen thinner and mostly gray, at most only slightly tinged with yellow (Western) ..... *gratiosus* Aldrich
9. With two or more black propleural bristles above each fore coxa 10
—. With only one black propleural bristle above each fore coxa 18
—. Without a black propleural bristle 11

10. Cheeks narrow, scarcely visible (Alaska).....*flavihirtus* Van Duzee
—. Cheeks wide, extending considerably below the eyes (Alaska) .....*brevicauda* Van Duzee
11. Second vein of wing very short, ending opposite the cross-vein (Texas, Kansas, South Dakota, Colorado).....*cerutias* Loew
—. Second vein normal, ending far beyond the cross-vein..... 12
12. Dorsocentrals minute, white; fore femora of male with a deep notch near the tip, their tibiæ bent (Wyoming, Kansas, South Dakota, California).....*canescens* Wheeler
—. Dorsocentrals black 13
13. Middle femora with long white hair on lower surface; last joint of middle tarsi enlarged; cheeks almost invisible (Michigan) .....*agalma* Wheeler
—. Middle femora with only very short white hair below, or the hair wholly black; cheeks wide or narrow..... 14
14. Wings with the cross-vein distinctly infuscated, usually forming a brown spot, sometimes a faint spot on last section of fourth vein; cheeks wide; beard and hairs on fore coxæ white (Alaska).....*pectinipes* Van Duzee
—. Wings without such spots or infuscation of the cross-veins..... 15
15. Hairs on dorsum of abdomen almost wholly white..... 16
—. Hairs on dorsum of abdomen black, except sometimes on the hind margins of the segments..... 17
16. Face with white pollen (Alaska).....*canites* Van Duzee
—. Face with pale yellow pollen; wing veins and costa yellow (New York) .....*flavipennis* Van Duzee
17. Cheeks wide, extending lobe-like below the eye (Alaska) .....*pectinipes* Van Duzee
—. Cheeks very narrow (British Columbia).....*nigrinervis* Van Duzee
18. Face opaque with pollen, the ground color not showing through 19
—. Face showing more or less metallic color through the pollen 22
19. Face ochre-yellow; wings with very conspicuous spots on the cross-vein and last section of fourth vein; veins blackish scarcely paler at base (Ontario).....*glaber* Walker
—. Pollen of face white; wings without spots on the veins..... 20
20. Veins broadly yellow at root of wing, sometimes mostly yellow (North America) .....*æstuum* Loew
—. Wing veins wholly black or brown..... 21
21. Beard and hairs of fore coxæ white; appendages of hypopygium long with long hairs at tip (British Columbia)..... .....*nigrinervis* Van Duzee
—. Beard yellow; hairs of fore coxæ a little yellowish; hypopygium with short appendages that have only short hair (Manitoba) .....*argentifacies* Van Duzee
22. Tips of fore tibiæ in both sexes with an acute angle produced toward the femora; fore coxæ with from one to three black bristles on upper outer corner..... 23

—. Tips of fore tibiæ not, or but little angulated 24

23. Wings without spots on the veins; face usually very bright blue-green as far down as the suture (North America) ..... *philombreus* Wheeler

—. Wings with the cross-vein infuscated, usually with a spot on its middle; upper part of face with the ground color showing through a little, but not bright metallic (Alaska) ..... *pectinipes* Van Duzee

24. Wings with a cloud on the cross-veins 25

—. Wings without a cloud on the cross-vein 28

25. Wings of both male and female with a faint spot on the cross-vein, but not on the last section of fourth vein 26

—. Wings with a conspicuous spot on both cross-vein and middle of last section of fourth vein 27

26. Fore tibiæ of male notched near apical third; female with a row of longer bristles near the tip of posterior surface, at the lower edge of fore femora (Western) ..... *breviseta* Thomson

—. Male with fore tibiæ plain; fore femora with the longest bristles near the base, on anterior surface of lower edge (Saskatchewan) ..... *criddlei* Van Duzee

27. Hairs on fore coxæ white or yellowish white, delicate (Alaska) ..... *viridifacies* Van Duzee

—. Hairs on fore coxæ deep yellow, quite stiff and long (Alaska) ..... *flavihirtus* Van Duzee

28. Fore femora of female with a single row of spines below on the anterior edge; those of male with an irregular stripe of spines below 29

—. Fore femora of male and female with a double row of spines below 30

29. Fore coxæ with abundant yellowish hair (Manitoba) ..... *claripennis* Van Duzee

—. Hair of fore coxæ wholly white, short, not abundant (Manitoba) ..... *purus* Curran

30. Pleuræ with thin brownish or yellowish pollen; length, 4.5 mm.; both rows of spines on lower surface of fore femora of about equal length (Western) ..... *magdalenæ* Wheeler

—. Pleuræ with white pollen; length, 3 mm.; fore femora with a row of five spines on lower posterior edge which are much longer than those in anterior row (Wyoming, Colorado, Utah) ..... *sodalis* Wheeler

31. Wings with a brown spot on the cross-vein and another on the middle of last section of fourth vein 32

—. Wings without spots on the veins 45

32. Face opaque with pollen, the ground color not showing through 33

—. Face showing some metallic color, the pollen not wholly concealing the ground color 37

33. Beard composed of black bristles and some yellowish hairs; face of female with yellowish-brown pollen, with a small spot of grayish pollen on each side below the suture; male with a small protuberance below near the tip of fore femora (Alaska) ..... *signiferus* Coquillett

—. Beard white or yellowish, sometimes a few black bristles under the neck 34

34. Fore coxæ with yellow hair, without black bristles (Wyoming) ..... *algens* Wheeler

—. Fore coxæ with black bristles besides those at tip 35

35. Spots on the wing veins faint; fore coxæ with a row of about sixteen bristles, shortest at base, longer toward the tip (Eastern) ..... *pirata* Loew

—. Wings with the spots on the veins very conspicuous 36

36. Fore coxæ with an irregular row of little black bristles on outer anterior edge; their pollen yellowish brown on inner portion, contrasting with the white pollen of outer surface; pollen of face yellowish brown (Eastern as far as Colorado) ..... *chrysologus* Walker

—. Fore coxæ with two rows of black bristles or stiff hairs exterior to the center of the front surface, their pollen whitish; pollen of face white (Alaska) ..... *brevicauda* Van Duzee

37. Propleuræ without a black bristle, having only pale hairs above the fore coxæ, or a yellowish bristle (British Columbia) ..... *phoca* Aldrich

—. Propleuræ with a black bristle above each fore coxa 38

38. Middle femora with long black bristles at base below, in male 4-5, in female 2 (Alaska) ..... *pilitarsis* Malloch

—. Middle femora without such bristles at base below 39

39. Females 40

—. Males 41

40. Fore femora with about seven spines below (Wyoming) ..... *algens* Wheeler

—. Fore femora without spines below, except sometimes three very small ones near the tip (Alaska) ..... *propinquus* Van Duzee

41. Fore femora plain, without a protuberance below near the tip 42

—. Fore femora with a protuberance near the tip below, preceded by about five spines in a group 43

42. Dorsocentral bristles long (Wyoming) ..... *algens* Wheeler

—. Dorsocentral bristles very short (Oregon) ..... *maculipennis* Van Duzee

43. Many black bristles mixed with the beard (Alaska) ..... *signiferus* Coquillett

—. Beard without black bristles, except sometimes a few under the neck 44

44. Fore coxæ with pale hairs (Alaska) ..... *propinquus* Van Duzee

—. Fore coxæ with the hairs wholly or almost wholly black (Alaska) ..... *nigribarbus* Van Duzee

45. Fore coxæ with black bristles or spines besides those at tip..... 46
—. Fore coxæ without black bristles, except at tip and sometimes these are missing, or there may be a hair-like one near the base..... 52
46. Face wholly opaque with pollen..... 47
—. Face showing some metallic color on upper portion..... 48
47. Fore coxæ with a row of spines, longer at base, running out apically (Eastern) ..... *parvus* Loew
—. Fore coxæ with a row of spines, longest at tip, running out basally (Eastern) ..... *pirata* Loew
—. Fore coxæ with a row of four black spines of about equal size on apical half (Manitoba)..... *lividipes* Van Duzee
48. Fore coxæ with black hair on anterior surface and a row of slender, bristle-like, hairs on outer edge (Alaska), male of ..... *nigribarbus* Van Duzee
—. Hairs of fore coxæ white or yellowish..... 49
49. Hairs on fore coxæ rather long, yellow; a row of 7-12 black bristles, of nearly equal length, on outer edge of apical half of anterior surface of fore coxæ, these bristles fewer and smaller in the female (Alaska)..... *brevicauda* Van Duzee
—. Hairs of fore coxæ white or yellowish white, minute..... 50
50. Fore coxæ with a row of bristles on outer edge, longest above, more or less interrupted in the middle (Alaska, Northwestern States) ..... *innotatus* Loew
—. Fore coxæ with a row about twelve rather short, black bristles of about equal length, extending nearly their whole length (Alaska) ..... *fumipennis* Van Duzee
—. Fore coxæ with a row of four black bristles on upper outer corner of anterior surface (Oregon)..... *vandykei* n. sp.
—. Fore coxæ with a row of about six black bristles on apical half 51
51. Fore femora near tip and fore tibiæ near base, with a small protuberance below (Alaska). Male of.... *propinquus* Van Duzee
—. Fore femora and tibiæ plain in the male (Colorado)..... ..... *altivagus* Aldrich
52. Face wholly opaque with white pollen..... 53
—. Face showing some metallic color on upper portion..... 55
—. Face wholly opaque with gray pollen; fore coxæ with yellowish pollen and rather long yellow hair, but wholly without black bristles (Alaska). Female of..... *aquatilis* Aldrich
53. Fore femora thick on basal part, slender on apical portion, with three long spines near basal third and a yellowish protuberance near the tip below, preceded by appendages that have slender, short stems and are much enlarged at tip (Quebec). Male of..... *extrarius* Aldrich
—. Fore femora without such protuberances..... 54

54. Beard and hairs of fore coxæ white (Alberta)..... *ampullaceus* Van Duzee
—. Beard and hairs of fore coxæ yellow (Manitoba)..... *argentifacies* Van Duzee
55. Cheeks forming a small lobe below the eyes (Alaska)..... *minimus* Van Duzee
—. Cheeks narrow, not forming a lobe, extending but little below the eyes 56
56. Fore femora modified, males..... 57
—. Fore femora plain, males and females..... 58
57. Fore femora with a small protuberance below near the tip, preceded by a group of little spines (South Dakota, Michigan, New York)..... *amplectens* Aldrich
—. Fore femora with a small excavation toward their apex and two small yellow protuberances, or flattened bristles, near tip on outer surface; third vein of wing distinctly thickened for some distance at base (Manitoba)..... *purus* Curran
58. Upper portion of face bright blue-green; middle femora on apical half of lower surface with dense curved bristles (Idaho, Washington)..... *pensus* Aldrich
—. Upper portion of face only a little greenish; middle femora without such bristles..... 59
59. Female with a single row of spines below; male with a stripe of spines below on fore femora and some flattened bristles on hind femora (Manitoba)..... *claripennis* Van Duzee
—. Fore femora with two rows of spines below. Females..... 60
60. A row of longer bristles on basal half of posterior side of fore femora and a row of shorter ones on apical half of front edge below (Quebec) ..... *extrarius* Aldrich
—. The two rows of spines reach nearly the whole length of the femora; spines all short (Manitoba)..... *purus* Curran

A list of the North American species of Hydrophorus together with the place of publication of those not in the Aldrich catalogue.

æstuum Loew.
agalma Wheeler.
albomaculatus Van Duzee, Psyche, Vol. xxxiii, p. 47, 1926.
algens Wheeler.
altivagus Aldrich, Psyche, Vol. xviii, p. 67, 1911.
amplectens Aldrich, Psyche, Vol. xviii, p. 67, 1911.
ampullaceus Van Duzee, Canadian Entomologist, Vol. lvi, p. 247, 1924.
aquatilis Aldrich, Proc. U. S. National Museum, Vol. lxi, Art. 25, p. 17, 1922.
argentatus Van Duzee, Entomological News, Vol. lix, p. 50, 1918.
argentifacies Van Duzee, Psyche, Vol. xxxiii, p. 51, 1926.

brevicauda Van Duzee, Ohio Journal of Science, Vol. xxiii, p. 259, 1923.
breviseta Thomson.
canescens Wheeler.
canities Van Duzee, Ohio Journal of Science, Vol. xxiii, p. 253, 1923.
cerutias Loew.
chrysologus Walker.
claripennis Van Duzee, Canadian Entomologist, Vol. lvi, p. 246, 1924.
criddlei Van Duzee, Psyche, Vol. xxxiii, p. 181, 1925.
curvipes Van Duzee, Entomological News, Vol. xxix, p. 48, 1918.
extrarius Aldrich, Psyche, Vol. xviii, p. 65, 1911.
flavihirtus Van Duzee, Ohio Journal of Science, Vol. xxiii, p. 259, 1923.
flavipennis Van Duzee, Psyche, Vol. xxxiii, p. 48, 1926.
fulvidorsum Van Duzee, Psyche, Vol. xxxii, p. 182, 1925.
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glaber Walker.
gratiosus Aldrich, Psyche, Vol. xviii, p. 49, 1911.
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intentus Aldrich, Psyche, Vol. xviii, p. 51, 1911.
lividipes Van Duzee, Psyche, Vol. xxxiii, p. 50, 1926.
maculipennis Van Duzee, Psyche, Vol. xxxiii, p. 45, 1926.
magdalenæ Wheeler.
minimus Van Duzee, Proc. U. S. National Museum, Vol. lxiii, Art. 21, p. 15, 1923.
nigribarbus Van Duzee, Ohio Journal of Science, Vol. xxiii, p. 257, 1923.
nigrinervis Van Duzee, Psyche, Vol. xxxiii, p. 46, 1926.
parvus Loew.
pectinipes Van Duzee, Ohio Journal of Science, Vol. xxiii, p. 254, 1923.
pensus Aldrich, Psyche, Vol. xviii, p. 68, 1911.
philombreus Wheeler.
phoca Aldrich, Psyche, Vol. xviii, p. 63, 1911.
pilitarsis Malloch, Report of the Canadian Arctic Expedition, Vol. iii, p. 51, 1919.
pirata Loew.
plumbeus Aldrich, Psyche, Vol. xviii, p. 50, 1911.
propinquus Van Duzee, Ohio Journal of Science, Vol. xxiii, p. 256, 1923.
purus Curran, Canadian Entomologist, Vol. lvi, p. 193, 1925.
signiferus Coquillett.
sodalis Wheeler.
vandykei Van Duzee, new species.
viridifacies Van Duzee, Ohio Journal of Science, Vol. xxiii, p. 255, 1923.

A NEW XYLOMYGES FROM CALIFORNIA (LEPID., PHALÆNIDÆ, CUCULLIINÆ)

BY WILLIAM BARNES AND F. H. BENJAMIN
Decatur, Illinois

Xylomyges vanduzeei Barnes and Benjamin sp. nov.

Head and thorax gray mixed with white; frons with a dull black bar; tegulæ with a black line; patagia with some black scales forming a line laterally; abdomen sordid luteous-brown tinged with gray, slightly darker dorsally in the form of a dorsal line. Fore wing dull gray irrorated with fuscous; a strong black streak below the base of the cell; basal, t. a. and t. p. lines obsolete; claviform rather large, defined by black along its costal and inner margins but open basally; orbicular large, oblique, tending to become more or less obsolescent, marked best along median vein, distally fused with the reniform which is large, irregular, more or less defined by black, with a more or less obsolescent central shade of rufous; median shade or line obsolete; s. t. line only defined by a few black dashes in the interspaces between the veins of the terminal area; fringe gray, intersected by a darker line and mesially checkered by blackish which is the continuation of the black s. t. dashes. Hind wing and its fringe nearly pure white, a few fuscous scales along the veins, with a black terminal line, discal spot showing through from the underside, no trace of a medial line, no darkening of the hair along the inner margin. Beneath: whitish; primaries clouded with fuscous; secondaries with a few scattered fuscous scales; discal dot present, large, strong, black; terminal line as on upper side.

Expanse: ♂ 32 mm.; ♀ 34 mm.

Belongs in the *simplex-crucialis* group, but the total lack of transverse maculation on the fore wing, and the lack of the median shade on the hind wing, ought easily to distinguish the species.

Type localities and number and sexes of types: Holotype ♂, Monterey County, California, no date; allotype ♀, Mill Valley, Marin County, California, IV-5-24 (E. P. Van Duzee).

Notes—Holotype in Barnes collection; allotype in California Academy of Sciences. The authors had the male of this species set aside as new, awaiting more material. Mr. Van Duzee sent the female for determination. We take pleasure in naming the species *vanduzeei* in acknowledgment of the many kindnesses of Mr. Van Duzee and his wholehearted desire to assist us in all ways.

NEW SPECIES OF COLORADIA (LEPID., SATURNIIDÆ)

BY WILLIAM BARNES AND F. H. BENJAMIN
Decatur, Illinois

Coloradia davisi Barnes and Benjamin, sp. nov.

Allied to *pandora,* with similar maculation. Fore wing blackish, lacking brownish tints, irrorated with white scales which help to distally define the s. t. line. Hind wing strongly tinged with rufous purple. Beneath strongly tinged with rufous purple.

Expanse: ♂ 62-73 mm., ♀ 74-85 mm.

Type locality: White Mountains, Arizona.

Number and sexes of types: Holotype ♂, 15-30 August, 1925; allotype ♀, 1-15 September, 1925; 54 ♂, 9 ♀ paratypes, various dates in August and September.

Notes: 6 ♂, 3 ♀ are simply labeled "White Mts. Ariz." without further data, have been in the Barnes collection for some years, and were presumably collected by Mr. R. D. Lusk. The remainder were collected by Mr. O. C. Poling near McNary P. O., White Mountains, Arizona. Part of the Poling catch was merely loaned to the Barnes collection to show range of variation and have been returned to Mr. Poling. At his suggestion the species is named *davisi* in honor of Mr. Charles L. Davis, Superintendent of the Fort Apache Indian Agency.

Coloradia luski Barnes and Benjamin, sp. nov.

A parallel development to *doris,* and bearing the same relation to *davisi* that *doris* has to *pandora.* Fore wing black, somewhat irrorated with white scales, the markings diffused. Hind wing strongly tinged with rufous purple. Beneath strongly tinged with rufous purple. Sexually dimorphic, the hind wings of the female darker and more heavily scaled than those of the male.

Because of strong sexual dimorphism present in the smaller forms, *doris* and *luski,* but absent in the larger forms, *pandora* and *davisi,* coupled with differences in vestiture, and the obsolescence of the discal spots in *doris* and *luski* lead us to consider them distinct species. This is corroborated by the fact that in the long series of *pandora* and *davisi* before us we find no tendency to intergrade with *doris* or *luski.*

Expanse: ♂ 57 mm., ♀ 60 mm.

Type locality: White Mountains, Arizona.

Number and sexes of types: Holotype ♂, allotype ♀, without dates, presumably collected by Mr. R. D. Lusk.

Coloradia lindseyi Barnes and Benjamin, sp. nov.

Allied to *pandora* and possibly only a northern race of that species. Fore wing of ♂ with maculation similar to *pandora* but somewhat darker. Secondaries more suffused with pink. Beneath, much more of the pinkish suffusion than in *pandora*. The ♀ has the fore wing much duller and browner, the hind wing and the underside of all wings much more suffused with pink than in *pandora*.

This appears to be the species or form commonly going as *pandora* in collections. It is the form figured by Strecker, 1878, Lep. Rhop. Het., 137, pl. XV, f. 7, from Oregon, as *pandora*. Strecker, 1900, Lep. Rhop. Het., Suppl., III, 30, lists ♂ type *pandora* in his collection, but from page 137 of his prior publication it can easily be seen that this type is spurious, being in reality a subsequent allotype different from the Blake type in the collection of the Academy of Natural Sciences, Philadelphia. Holland, 1903, Moth Book, 91, pl. X, f. 8, illustrates what he calls *pandora,* but the figure is more likely that of a faded *lindseyi*. At least most of the records of *pandora* from the Northwest seem to refer to *lindseyi*. According to type comparisons by Doctor McDunnough, the types of *loiperda* and *pandora* represent the form not uncommon in the vicinity of Glenwood Springs, Colorado.

Expanse: ♂ 78-80 mm., ♀ 82-87 mm.

Type localities: Warner Mountains, three miles east of Davis Creek; Davis Creek, Modoc County, California (A. W. Lindsey); Klamath Falls, Klamath County, Oregon (E. C. Van Dyke).

Number and sexes of types: Holotype, ♂ 8-15 July, 1922, allotype ♀, 24-31 July, 1922, 1 ♂ paratype, 24-31 July, 1922, from Warner Mountains; 1 ♂ paratype, 18 July, 1922, from Davis Creek (4800 feet); 1 ♀ paratype, VII, 1922, from Klamath Falls.

Note—A third female, presumably the same, and probably collected by Prof. Owen in northern California or Oregon, is in the Barnes collection, but because of lack of label it is not

made a type; a fourth male from Fresno County, California, also seems to fall here.

Coloradia bonniwelli Barnes and Benjamin, sp. nov.

Allied to *pandora,* with similar maculation, ♂, fore wing darker, intermediate to *davisi,* contrasty. ♀ similar to *pandora,* fore wing with the ground smoother, as in *doris,* but the maculation contrasty, hind wing as in *pandora.* Both sexes with undersides as in *pandora.* The average size smaller than *pandora.*

Expanse: ♂ 64-70 mm., ♀ 75 mm.

Type locality: High Rolls, New Mexico (J. G. Bonniwell).

Number and sexes of types: Holotype ♂, allotype ♀, 2 ♂ paratypes, all labeled 9-20.

Coloradia chiricahua Barnes and Benjamin, sp. nov.

Allied to *pandora,* with similar maculation, but much smaller. Fore wing with black transverse lines more intensified on a ground more heavily powdered with white scales, s. t. line strongly defined by white distally. Hind wing nearly white, slightly tinged with pink. No trace of the brownish or sordid appearance of *pandora.* Beneath paler than in *pandora,* and lacking much of the sordid appearance of that species.

Expanse: 60 mm.

Type locality: Chiricahua Mountains, Cochise County, Arizona.

Number and sexes of types: Holotype ♂, without date, unique.

Coloradia duffneri Barnes and Benjamin, sp. nov.

Allied to *pandora,* with similar maculation. Fore wings lacking brownish tints and heavily irrorated with white. The transverse lines more intensified. S. t. line obsolescent, but distally defined by white scales. Space between t. a. and t. p. lines so powdered with white as to appear disconcolorous and contrasting. Discal dot reduced to about half normal size. Hind wing with the rufous stronger. Beneath with the rufous more intensified.

Expanse: 67 mm.

Type locality: Paradise, Cochise County, Arizona. (O. Duffner via O. C. Poling.)

Number and sexes of types: Holotype ♂, labeled "Fall 1925," unique.

SYNONYMIC NOTES ON ARCTIIDÆ (LEPID.)

BY WILLIAM BARNES AND F. H. BENJAMIN
Decatur, Illinois

EUBAPHE FERRUGINOSA Wlk.

1854, Walker, Cat. Lep. Het. B. M., II, 535, ***Crocota.***
1889, Smith, Can. Ent., XXI, 195, ***Crocota.***
1901, Hampson, Cat. Lep. Phal. B. M., III, 192 (partim.), ***aurantiaca, Holomelina.***
1910, Rothschild, Nov. Zool., XVII, 76, an sp. dist., ***Holomelina.***
1920, Hampson, Cat. Lep. Phal. B. M., Suppl., II, 317, pl. LVI, 19, ***Eubaphe.***

trimaculosa Reak.

1864, Reakirt, Proc. Ent. Soc. Phila., II, 372, ***Crocota.***
1893, Neumoegen and Dyar, Jour. N. Y. Ent. Soc., I, 157, *immaculata* var., ***Eubaphe.***
1919, Seitz, Macrolep, VI, 294, *immaculata* form, ***Eubaphe.***
1920, Hampson, Cat. Lep. Phal. B. M., Suppl., II, 317, *ferruginosa*, ***Eubaphe.***

obscura Stretch (partim.).

1885, Stretch, Ent. Amer., I, 103 (partim.), ***Crocota.***
1925, Barnes and Benjamin, Pan.-Pac. Ent., I. 128, *immaculata trimaculosa*, ***Eubaphe.***

form immaculata Reak.

1864, Reakirt, Proc. Ent. Soc. Phila., II, 372, ***Crocota.***
1889, Smith, Can. Ent., XXI, 195, ***Crocota.***
1893, Neumoegen and Dyar, Jour. N. Y. Ent. Soc., I, 157, ***Eubaphe.***
1919, Seitz, Macrolep., VI, 294, pl. XXXVIII, a, ***Eubaphe.***
1920, Hampson, Cat. Lep. Phal. B. M., Suppl., II, 317, *ferruginosa* ab., ***Eubaphe.***

A specimen compared with the type of *ferruginosa* Wlk. by Mr. Tams shows that the name takes priority over species name *immaculata* Reak. The specimen compared with Walker's type agrees with specimens compared with the types of *trimaculosa* by Doctor McDunnough. The name *immaculata* Reak. can stand as a form of *ferruginosa*. For notes on the types of *obscura* Stretch see Barnes and Benjamin, 1925.

E. ferruginosa Auct. nec Wlk. refers to *aurantiaca* Hbn. Holland's figure of *immaculata* (Moth Book, pl. XIV, f. 20) seems to refer to *opella* form *nigricans* Reak.

Hampson's synonymy of 1920 appears essentially correct from the standpoint of comparison with the actual types involved.

ARACHNIS AULÆA Geyer

1837, Geyer, Zutr. exot. Schmett., V, 28, pl. CLVII, ff. 913-914, *Arachnis.*
1881, Oberthür, Ét. d'Ent., VI, 111, pl. XIX, ff. 4, 7, *Ecpantheria.*
1883, Schaus, Pap., III, 188 (biol.), *Ecpantheria.*
1890, Smith, Can. Ent., XXII, 177, *Arachnis.*
1893, Neumoegen and Dyar, Jour. N. Y. Ent. Soc., I, 179, *Arachnis.*
1894, Dyar, Can. Ent., XXVI, 307 (biol.), *Arachnis.*
1896, Ottolengui, Ent. News, VII, 126, pl. IV, *Arachnis.*
1897, Druce, Biol. Centr. Am., Lep. Het., II, 377, *Arachnis.*
1901, Hampson, Cat. Lep. Phal. B. M., III, 390, text f. 163 (biol.), *Arachnis.*

incarnata Wlk.

1854, Walker, Cat. Lep. Het. B. M., III, 690, *Ecpantheria.*

ARACHNIS POMPEIA Druce

1894, Druce, Ann. Mag. Nat. Hist. (6), XIII, 174, *Arachnis.*
1897, Druce, Biol. Centr. Am., Lep., Het., II, 377, pl. LXXV, 2-3, *Arachnis.*
1901, Hampson, Cat. Lep. Phal. B. M., III, 389, *Arachnis.*

‡*aulæa* Auct. (nec. Geyer).

1903, Holland, Moth Book., 124, pl. XVI, f. 1, *Arachnis.*
1912, Barnes and McDunnough, Contrib., I, (4), 7, pl. II, f. 1, *Arachnis.*

This note is primarily to call attention to the fact that *pompeia* has been figured as *aulæa* by B. and McD., and probably also by Holland. The latter figure shows primaries similar to *aulæa* and secondaries of *pompeia.* We suspect that the specimen is a faded *pompeia,* especially as Holland records the species from Arizona.

The Barnes collection possesses three specimens of *pompeia* from Arizona (Biederman) one of which is the specimen figured in the contributions as *aulæa.* This specimen was recently examined by Mr. Tams in connection with the British Museum types, and we are informed that it is conspecific with the type of *pompeia.*

The species going in both the British Museum and the United States National Museum as *aulæa,* and appearing to agree fairly well with Geyer's figures, is represented in the Barnes collection by a series of specimens, mostly without labels. Two are labeled "Jalapa" (Mexico); one, "S. Tex."; and one, "N. Mex." We cannot be sure of the authenticity of these labels. It is possible that true *aulæa* does not occur in the United States.

We cannot state which references under *aulæa* really refer to *pompeia,* but at any rate the latter name must be added to our lists.

The species may be sorted by the fact that the gray on the thorax and fore wings of *pompeia* is dark, nearly fuscous, and the red of the hind wings is a bright rich crimson; while the gray on the thorax and fore wings of *aulæa* is quite pale, about the same shade as in *picta,* and the red of the hind wings is duller, also about the same shade as in *picta.*

PYGARCTIA MURINA Stretch

1885, Stretch, Ent. Amer., I, 106, ***Euchætes.***
1890, Smith, Can. Ent., XXII, 175, ***Euchætes.***
1892, Kirby, Syn. Cat. Lep. Het., I, 236, ***Cycnia.***
1893, Neumoegen and Dyar, Jour. N. Y. Ent. Soc., I, 166, ***Cycnia.***
1920, Hampson, Cat. Lep. Phal. B. M., Suppl., II, 466, ***Pygarctia.***

poliochroa Hamp.

1916, Hampson, Nov. Zool., XXIII, 238, ***Pygarctia.***
1920, Hampson, Cat. Lep. Phal. B. M., Suppl., II, 466, pl. LXIV, f. 10, ***Pygarctia.***

PYGARCTIA MURINA ALBISTRIGATA B. and McD.

1913, Barnes and McDunnough, Contrib., II, (3), 103, pl. III, ff. 10, 12, ***murina*** ssp., ***Pygarctia.***
1920, Hampson, Cat. Lep. Phal. B. M., Suppl., II, 466, ***murina*** form, ***Pygarctia.***

‡ *murina* Auct. (nec. Stretch).

1901, Hampson, Cat. Lep. Phal. B. M., III, 420, pl. XLVIII, f. 17, ***Euchætes.***
1903, Holland, Moth Book, 135, pl. XI, f. 18, ***Euchætias.***

A specimen compared with the type of *poliochroa* by Mr. Tams shows this to be the Arizona insect previously described as *murina* by Stretch.

The figures of *"murina"* by both Hampson and Holland refer to the Texas subspecies named *albistrigata.* Hampson's figure is based upon a specimen in collection Schaus, so that it would seem that the Stretch name has been incorrectly determined in a number of collections.

P. murina murina is in the Barnes collection from Arizona only, Huachuca Mountains, Santa Rita Mountains, Baboquivari Mountains, Redington, Paradise, and Douglas. *P. murina albistrigata* is represented from San Benito, Texas, only. We suspect that most of the Texas records for *murina* refer to *albistrigata.*

NEW CALIFORNIA THYSANOPTERA WITH NOTES ON OTHER SPECIES

BY DUDLEY MOULTON
San Francisco

Ankothrips gracilis Moulton, new species

Female, holotype. Measurements: Head, length .133 mm., width .15 mm.; prothorax, length .12 mm., width .18 mm.; mesothorax, width .22 mm.; total body length 1.25 mm. Antennæ: segment one 18 microns; two 54 m.; three 57 m.; four 51 m.; five 39 m.; six 39 m.; seven, (l) 18, (r) 20 m.; eight 15 m.; nine, (l) 20 m., (r) 18 m.; total length 270 microns. Wing length .68 mm., width .09 mm.

Color light yellowish brown including all legs and segments one and two of antenna. Segments three and four of antenna shading to dark brown in the outer half, segments five to nine dark brown. Crescents of ocelli brown. Wings slightly smoky, veins yellowish. All prominent spines yellowish to transparent.

Head including anterior projection almost as long as wide. Anterior projection angular, slightly emarginate in front, with two nearly straight bristles directed outward and backward, 24 microns (Fig. 1). Interocular bristles placed well forward near inner margin of eyes, 33 microns. Three pairs of postocular bristles near posterior margin of eyes, outer pair longest, 33 microns, median pair shortest, 18 microns, inner pair 21 microns. Eyes occupying about three-sevenths the side of the head, protruding in front, emarginate only on the sides, facets small. Ocelli inconspicuous. Antennæ with nine segments, slightly more than twice as long as head; projection on segment two dentate on either side, tip simple and pointed. Maxillary palpi with three segments.

Prothorax almost as long as head and one-third wider, prominent spines along anterior, lateral and posterior margins, a single one on each posterior angle longest, 45 microns. Mesothorax largest; metathorax noticeably smaller. Legs slender, fore femora only slightly thickened. Wings with parallel sides and rounded tip, typical of the genus. Costa with 32, fore vein with 24-23 and posterior vein with 18 spines; five cross-veins.

Abdomen elongate-ovate, with pointed tip. Longest spines on segment nine, 99 microns, and on segment ten, 81 microns.

Male, allotype. Measurements: Head, length .11 mm., width .13 mm.; prothorax, length .12 mm., width .15 mm.; mesothorax, width .18 mm.; total body length .85 mm. Antennæ: segment one 18 m.; two 48-54 m.; three 57 m.; four 48-45 m.; five 42-39 m.; six 39 m.; seven 20 m.; eight 15-12 m.; nine 18 m.; total length 270 microns. Wing length .55 mm., width .069 mm.; spines on wing, costa 26, fore longitudinal vein 18, posterior 17.

About two-thirds as large as female. Similar in color, interocular

spines 30 microns; postoculars, outer 36 m., median 18 m., inner 21 m.; spines on posterior angle of prothorax 45 m. A pair of long spines on posterior margin of eighth abdominal segment, 48 microns; ninth without a group of short stout bristles, and bearing only long slender spines on each posterior angle, 99 microns; a second pair of shorter ones near median posterior border, 39 microns; longest spines on segment ten, 78 microns (Fig. 2).

Described from nine females and three males taken from blossoms of "Chamise," *Adenostoma fasciculatum* near Riverside and Mayfield, California, May 16, 1926. All types are in author's collection.

Ankothrips æqualis Moulton, new species

Female, holotype. Measurements: Head, length .135 mm., width .20 mm.; prothorax, length .192 mm., width .27 mm.; mesothorax, width .36 mm.; total body length 1.56 mm. Antennæ: segment one 24 microns; two 75 m.; three 69 m.; four 60-63 m.; five 54 m.; six 48 m.; seven 24 m.; eight 15 m.; nine 21-24 m.; total length 360 microns. Wing length .92 mm., width .13 mm.

General color light brownish yellow, pterothorax orange-yellow; a dark brown line across anterior margins of abdominal segments two to seven inclusive, on the ventral side. Segments one and two of antenna yellow, three yellowish at base shading to light brown, four to nine dark brown. Ocelli with bright orange-red crescents. Legs concolorous with body except anterior margins of femurs and tibiæ which are shaded brown. Wings slightly smoky, veins yellow. All prominent spines on body and wings deep brown.

Head, including anterior projection, distinctly wider than long. Anterior projection with sides parallel, emarginate in front, both points rounded, each bearing a short upward and outwardly curved bristle (Fig. 3). Interocular bristles prominent, 39 microns. The three pairs of postocular bristles situated rather close to posterior margin of eyes, subequal, 48 microns in length. Eyes large, pilose, protruding, especially in front. Anterior ocellus on apex of head directed forward, posterior ocelli bordering inner margins of eyes. Antennæ two and one-half times as long as head; projection on segment two with simple, pointed tip, but with an indentation on either side forming two additional points near the tip. Horseshoe-shaped transparent sense-areas at the end of segments three and four. Maxillary palpi with three segments, 30, 21, and 15 microns long respectively. Labial palpi with two segments.

Prothorax about one-third longer than head and one-third wider than long. Three forward directed spines on each anterior angle, longest 30 microns; three conspicuous spines along each side; two prominent spines on posterior angles, outer longest, 75 microns, inner 48 microns; eleven other strong spines along posterior margin, subequal, 45 microns.

Pterothorax with all angles rounded. Legs slender, fore femora thickened. Wings about eight times as long as wide, with parallel sides, broadly rounded at tip. Costa with 35, fore longitudinal veins with 28-26, posterior vein with twenty-three dark brown spines; five cross-veins.

Abdomen subovate. Longest spines on segment nine, 123 microns, and on segment ten, 99 microns.

Male, allotype. Measurements: Head, length .15 mm., width .195 mm.; prothorax, length .275 mm., width .255 mm.; mesothorax, width .33 mm.; total body length 1.33 mm. Antennæ: segment one 24 microns; two 69 m.; three 69-75 m.; four 66 m.; five 57-60 m.; six 51 m.; seven 24 m.; eight 15 m.; nine 21 m.; total length 360 microns. Wing length .83 mm., width .10 mm.

Male somewhat smaller than female; similar in color. Length of interocular spines 39 microns; postoculars subequal, 48 microns; spines on posterior angle of prothorax, outer 75 microns, inner 45 microns. Ninth abdominal segment bearing many short strong bristles on dorsum, the inner anterior pair strongest, 42 microns long and 6 microns wide at base; the outer posterior pair 48 microns long; longest spines on posterior angles of segment nine 135 microns and on segment ten, 115 microns (Fig. 4).

Described from thirteen females and eight males taken from blossoms of a species of Prunus near **Redwood City, California,** April 13 and 18, 1926. Mr. E. J. Newcomer also collected this species from *Spiræa corymbosa, Schizonotus discolor* and *Sambucus glauca* at Wenatchee, Washington, June 29, 1916. All types are in the author's collection.

Chirothrips similis Bagnall, 1909

This species has heretofore been found only in England and central Europe, and taken chiefly from roses and grasses. The author now records it as a common species in the San Francisco bay region, California, and during the last two years has taken it from grasses, wild lupine, coyote mint (*Monardella villosa)* and the terminal leaf clusters of prune trees.

On June 14, of this year, the author observed specimens of this species which had been trapped on the leaves of "mules ears," *Wyethia glabra,* near Mayfield, California. This plant exudes a resinous substance over the surface of its broad leaves which makes them sticky, and in this case acted as effectively as fly paper. More than two hundred specimens were thus caught on a single plant.

Drepanothrips reuteri Uzel

This species has been known heretofore only in England, central Europe and Italy, and the recorded host plants are grape vines and the leaves of various trees, chiefly oak, beechnut, and hazelnut. Mr. Theodore D. Urbahns, of the State Department of Agriculture at Sacramento, has collected many specimens of this thrips from grape vines near Florin, Sacramento County, California, and reports that it has been doing considerable damage.

The writer collected many specimens of males and females from grape vines near Mountain View, Santa Clara Valley, California, on June 26 of this year. This is the first record of the appearance of this insect in America; it has apparently been introduced on grape vines from Europe.

Genus Anaphothrips Uzel

The genus Prosopothrips, which immediately precedes the genus Anaphothrips in the orderly sequence of relationship, is characterized by strong reticulation over the body. The writer mentioned in the original description of *Anaphothrips reticulatus (Sericothrips reticulatus)* that "this species has many characters in common with *Prosopothrips vejdovskyi* described by Uzel." The conspicuous reticulation and the angular projection on the front of the head set this species apart from other members of the genus, while the larval forms are typical of the genus. The writer now introduces a new subgenus based on these characters and names it

Prosopoanaphothrips Moulton, new subgenus,

and designates as its type the species *Anaphothrips (Prosopoanaphothrips) reticulatus* Moulton, 1907.*

Many specimens newly collected in the San Francisco bay region from February to June of this year show that the species varies in color from uniform brown to very dark brown, with the legs uniformly yellow brown to light brown. The male of the species is also found commonly with the females and is described as follows:

Male, allotype. Measurements: Head, length .15 mm., width .16 mm.; prothorax, length .13 mm., width .20 mm.; mesothorax, width .21 mm.; total body length 1.36 mm. Antennæ: segment one 27 m.;

* Technical Series 12, Part III, Bureau of Entomology, U. S. Dept. Agr., p. 50, April, 1907.

two 42 m.; three 48 m.; four 45 m.; five 45 m.; six 60 m.; seven 15 m.; eight 18 m.; total length 285 microns.

Color: Head and mouth parts and segments one, outer half of five, six, seven, and eight of antennæ dark brown. Thorax, abdomen, legs and segments two, three, four, and basal half of five of antennæ yellow, slightly shaded with orange.

Head and prothorax strongly reticulate, abdominal segments, excepting nine and ten, reticulate indistinctly, head slightly wider than long; vertex sulcate as in the female, with two prominent darkened, angular projections over basal segments of antennæ. Head without conspicuous spines. Eyes prominent; ocelli absent. Antenna eight-segmented, about twice as long as head, with a single long sense cone on segments three and four, and a short one on segment five.

Prothorax somewhat shorter than head; mesothorax smallest. Wings absent. All legs medium stout.

Abdomen elongate, segments two to eight almost equal in length and only slightly wider near the middle. Ninth abdominal segment with two pairs of stout spindle-shaped bristles near the middle. Longest spine on ninth abdominal segment 90 microns, on segment ten 69 microns (Fig. 5).

Described from eight specimens.

Host plants, grass and weeds in California, and *Æsculus pavia* (Southern Buckeye) and Vinca sp.? (Myrtle) in Alabama. All types in author's collection.

Anaphothrips (Anaphothrips) stanfordi Moulton, 1907

Male, allotype. Measurements: Head, length .105 mm., width .126 mm.; prothorax, length .120 mm., width .152 mm.; total body length .95 mm. Antennæ: segment one 18 microns; two 33 m.; three 36 m.; four 33 m.; five 30 m.; six 39 m.; seven 9 m.; eight 12 m.; total length 210 microns.

Color: Head and mouth parts dark brown. Thorax, abdomen, and legs uniform light yellowish brown to brown. Segments one and five to eight of antennæ dark brown. Segments two and three yellow, four yellow shading to brown. Heavy spines on ninth abdominal segment dark brown.

Males wingless, ocelli absent. The two pairs of heavy spines on the dorsal side of the ninth abdominal segment are located near the posterior margin of the segment (Fig. 6).

This species was originally described as a Sericothrips, but it is closely related to the European *Anaphothrips secticornis*.

Anaphothrips (Anaphothrips) apteris Daniel

The females of this species are most readily distinguished by the light yellowish brown color of the pterothorax, while

the rest of the body is deep brown or black. In life they often appear to be jet black, each with a yellow crossband. The males are smaller and are likewise dark brown in color with yellow or light yellowish brown pterothorax. Inner anterior pair of heavy spines on dorsal side of the ninth abdominal segment located rather near the center of the dorsum, at least twice as long as the outer posterior pair. Both pairs of the spines very dark and conspicuous.

This species has heretofore been classified under the genus Sericothrips, but is also closely related to *A. stanfordi,* and at times it is difficult to differentiate between the two species. The brown *stanfordi* is sometimes almost black, and the dark brown or black *apteris* may be lighter in color with the yellow pterothorax shading to brown, and almost uniform with the rest of the body.

Anaphothrips tricolor was described by the writer in 1911,* and a new and closely related species is now offered and named *A. bicolor.* Both species are characterized by an arrangement of angular plates, each bearing one and sometimes two spines, along the posterior margin of second to eighth abdominal segments, especially conspicuous on the seventh and eighth. A new subgenus is here erected to include these forms and the species *A. tricolor* is designated as its type.

Odontanaphothrips Moulton, new subgenus

Anaphothrips (Odontanaphothrips) enceliæ

new species

Female, holotype. Measurements: Head, length .09 mm., width .126 mm.; prothorax, length .105 mm., width .15 mm.; mesothorax, width .20 mm.; total body length .93 mm. Antennæ: segment one 15 microns; two 30 m.; three 39 m.; four, five, and six 36 m.; seven and eight 9 m.; nine 12 m.; total .222 mm. Wing length .585 mm.

Color: Head, prothorax, segments one to four of abdomen inclusive, all legs and segments one to three of antenna, light brownish yellow. Pterothorax slightly orange-yellow. Antennal segments four to nine light yellowish brown shading to dark brown. Abdominal segments five to ten uniformly dark brown. Crescents of ocelli light brown.

Head about one and one-third times as wide as long, cheeks arched; front of head broadly rounded; back of head faintly cross-striated, without prominent spines. Eyes prominent, occupying about two-thirds the width and one-half the length of the head. Ocelli

* Technical Series No. 21, Bureau of Entomology, U. S. Dept. Agr., June 13, 1911, p. 41.

present, inconspicuous (Fig. 7). Mouth cone long, angular, tipped with black, and reaching posterior margin of prosternum. Maxillary palpi three-segmented, labial palpi two-segmented. Antenna clearly with nine segments, slightly more than twice as long as head.

Prothorax about one and one-half times wider than head, sides slightly arched. One prominent spine on each posterior angle (39 microns). Mesothorax widest, emargination between meso- and metathorax deep. Legs slender. Wings transparent, veins slightly yellowish and prominent; anterior longitudinal vein joining the ring vein just before the tip, posterior longitudinal vein ending abruptly just before the tip. Two cross veins, an anterior one connecting the anterior longitudinal vein with ring vein at about one-third the wing's length from the end, and a median one connecting the two longitudinal veins at about one-third the wing's length from the base. The posterior longitudinal vein beginning abruptly just before the median cross vein. Anterior longitudinal vein bearing twelve more or less regularly placed spines between base of wing and anterior cross vein and three scattered spines on its distal third. Posterior longitudinal vein bearing fourteen spines scattered over its entire length. Anterior fringe hairs weak and single, posterior hairs weak and double (Fig. 8).

Abdomen from segments one to eight broadly ovate; ninth and tenth triangular in outline. Posterior margin of abdominal segments five to eight inclusive with an arrangement of angular plates, each bearing a short sharp spine. These spines longest and most conspicuous on segment eight, not so prominent on seven, and gradually disappearing at middle of segments six and five (Fig. 9).

Habitat, Coachella Valley, Imperial County, California.

Host plant "Desert Sunflower," *Encelia eriocephala.*

Described from a single female specimen (holotype) now in author's collection. Male unknown.

Thrips heraclei Moulton, new species

Female, holotype. Measurements: Head, length .10 mm., width .12 mm.; prothorax, length .13 mm., width .16 mm.; mesothorax, width .14 mm.; total body length 1.25 mm. Antennæ: segment one 21 microns, two 36 m.; three 51 m.; four 51 m.; five 42 m.; six 51 m.; seven 18 m.; total length 270 microns.

General color almost uniformly light brownish yellow. Segments one, two, and three of antenna concolorous with head and body, one a little lighter; segments four and five brown in distal half, six and seven brown. Pigments of compound eyes deep purple; crescents of ocelli bright reddish orange. Tip of mouth cone brown, a brown spot on each tarsus.

Head only slightly wider than long, rounded in front, sometimes slightly angular. Cheeks arched. Interocular bristles prominent, brown, placed closely in front of posterior ocelli, 24 microns in length. Postoculars yellow and inconspicuous, 15 microns. Eyes

prominent but not protruding, occupying about one-half the length of the head. Ocelli approximate, separated from inner margin of eyes. Mouth cone triangular, reaching posterior margin of prosternum. Antennæ 2.7 times as long as head; a forked sense cone on outer dorsal side of segment three near tip and one on inner ventral side of segment four.

Prothorax about 1.3 times wider than head, angles rounded, sides arched. Two prominent dark brown spines on each posterior angle (inner 75 microns, outer 60 microns). Mesothorax largest. Legs moderately stout. Wings dusky; all spines long, brown and conspicuous, 22 on costa, fore vein with seven in basal half and three scattered in distal half of wing; posterior vein with eleven regularly spaced spines, scale 6.

Abdomen elongate ovate, only segments nine and ten narrowed abruptly and together triangular in shape. Weak, comb-like arrangement of small hairs along posterior margin of segment eight, a circle of eight long dark spines (120 microns) on segment nine, and a similar whorl on segment ten (longest 120 microns). Tenth segment with a faint median dorsal suture extending about three-quarters its length from tip.

Male, allotype. Measurements: Head, length .09 mm., width .105 mm.; prothorax, length .096 mm., width .126 mm.; mesothorax, width .165 mm.; wing length .52 mm.; total body length .88 mm. Antennæ: segment one 21 microns; two 30 m.; three 44 m.; four 44 m.; five 36 m.; six 51 m.; seven 15 m.; total length 241 microns.

General color same as in female except distal half of antennal segments four and five which are light brown, and basal third of segment six which is very light brown.

Head only slightly wider than long. Cheeks arched. Interocular bristles brown, conspicuous, 18 microns. Postoculars yellow, inconspicuous, 15 microns. Eyes prominent, occupying about one-half the length of the head. Ocelli approximate. Mouth cone reaching posterior margin of prosternum. Antenna 2.7 times as long as head. Forked sense cones as in female.

Prothorax only slightly longer and slightly wider than head. Spines on posterior angles dark brown and conspicuous, the inner ones longer, 45 microns, the outer 27 microns. Legs moderately stout. Wings dusky; all prominent spines dark brown, 16 on costa, 10 on fore longitudinal vein, and 11 on posterior vein, scale 6.

Abdomen slender. Longest spine on segments nine and ten dark brown (75 microns).

Described from ten females collected July 24, 1925, and eleven females and three males collected June 16, 1926, from *Heracleum lanatum* (cow parsnip), above Spring Valley Lakes near Belmont, California. All types in author's collection. In life these thrips are of a bright golden color and are rather sluggish.

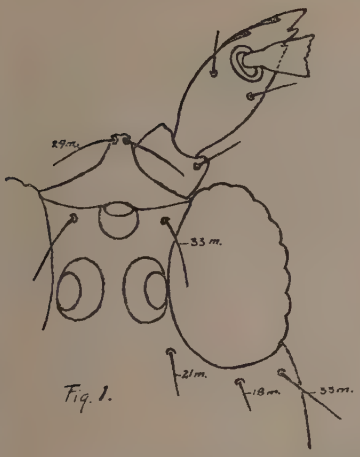


Fig. 1.

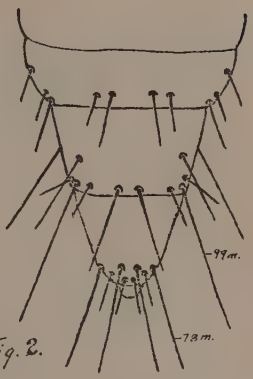


Fig. 2.

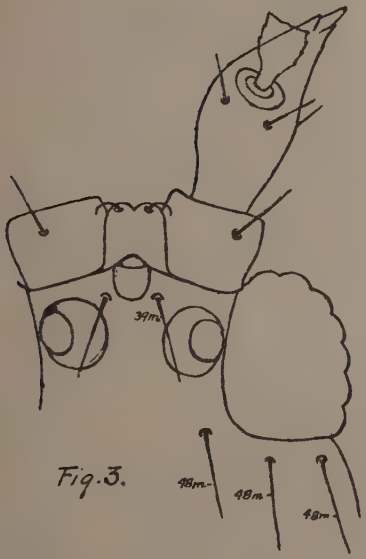


Fig. 3.

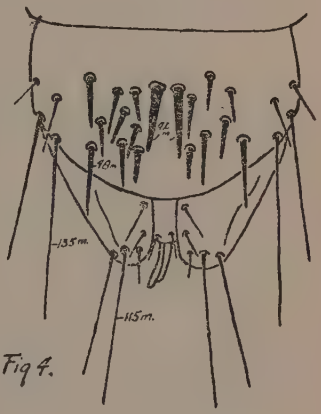


Fig 4.

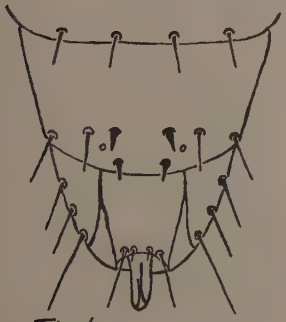


Fig. 6.

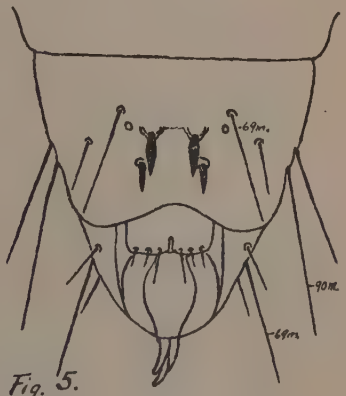
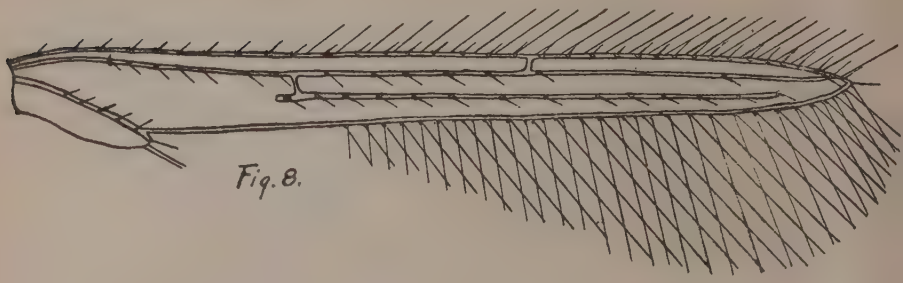
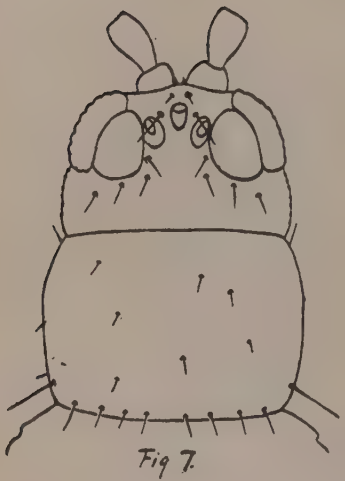
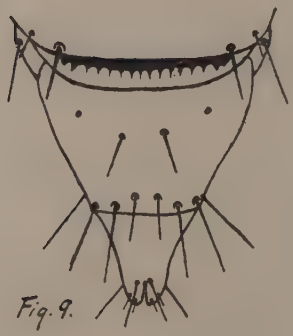


Fig. 5.







Illustrations

Fig. 1. *Ankothrips gracilis* female, portion of head and antennal segments one and two, dorsal view.

Fig. 2. *Ankothrips gracilis* male, end of abdomen, dorsal view.

Fig. 3. *Ankothrips æqualis* female, portion of head and antennal segments one and two, dorsal view.

Fig. 4. *Ankothrips æqualis* male, end of abdomen, dorsal view.

Fig. 5. *Anaphothrips reticulatus* male, end of abdomen, dorsal view.

Fig. 6. *Anaphothrips stanfordi* male, end of abdomen, dorsal view.

Fig. 7. *Anaphothrips bicolor* female, head and prothorax, dorsal view.

Fig. 8. *Anaphothrips bicolor* female, right fore wing.

Fig. 9. *Anaphothrips bicolor* female, end of abdomen, dorsal view.

A DEVICE FOR DETERMINING THE RELATIVE DEGREE OF INSECT OCCURRENCE

BY E. A. MCGREGOR
United States Bureau of Entomology

Throughout our entomological experience we have been impressed by the lack in our science of a criterion or means of judging correctly (1) the absolute degree of infestation of a given insect within a definite crop unit; (2) the degree of infestation of a given insect within one crop unit in relation to its severity in another distinct crop unit; and (3) the degree of infestation of a given insect during one period of time in relation to the degree of occurrence during a different period in the same crop unit. Furthermore, in the literature of economic entomology, where such insect values as these are discussed, the reader is often unconvinced as to the infallibility of the method used by the worker in reaching his estimates.

We had not long been engaged in our present project (the citrus thrips) before it became evident that our insect possesses characteristics such as to make status studies very difficult. Some of the features which make insects refractory in this respect are: minuteness, quickness of movement, timidity, secretiveness, and a tendency to blend visually with the foliage of the supporting plant. In attempting to obviate these disconcerting factors the writer evolved the device which is described in the present paper. For it we propose the names "pest gauge" or "recovery trap."

The pest gauge consists of four primary units (Figure 1), each of which will be described separately. Unit "1" is a light, durable box of convenient size and shape with a hinged lid. The box we have used is 8 inches by 6 inches by 2½ inches in dimensions. A cigar box will be found to fill these requirements. Unit "2" is a sheet of paper on which a thin film of "tanglefoot" preparation is applied with a painter's brush. In size this sheet is such as to fit rather snugly at the bottom of the box (inside). It is very advisable to leave a one-half-inch margin of this sheet free of the sticky substance so as to facilitate its handling. The actual adhesive area of the sheet, as used by us, is 25 square inches. We use black paper (as will be explained later). Unit "3" is a frame of wood or corrugated

cardboard of the same dimensions as the sticky sheet and, like unit "2," fits the box snugly. Its opening corresponds in size and exactly registers with the sticky area of the above sheet. Unit "4" is a channel-shaped piece of screen of dimensions such as to permit it readily to enter the box. It rests upon the above described frame. The mesh of the screen should be of a selective nature, that is, it must be large enough to allow the insect to be studied to fall through the mesh, but at the same time it must prevent larger insects, and especially trash, from passing through onto the sticky capture sheet.

When the device is assembled the arrangement is as follows: the adhesive (capture) sheet lies directly on the inner bottom surface of the box; the frame lies immediately on the capture sheet; the screen rests on the frame; the box lid is closed to preclude the possibility of "stragglers" reaching the capture sheet until the trap is put in operation.

The color of the paper to be used for the sticky capture sheets will be determined by the general color of the insects to be studied. We employ black paper for this purpose because of the fact that the citrus thrips is a pale insect, and is more readily seen and counted on a black background. For dark-colored species a white paper is preferable. No arbitrary size need be stipulated for the sticky capture sheets. This is a factor of no particular importance. However, for a given insect project it is vital that a sheet of standard size be adopted and employed consistently throughout the course of the project. The reason for uniformity is obvious, for without it the basis for comparison (both absolute and relative) would be nonisometric and inexact.

The preparation of the sticky capture sheets is simple. Only three components are required, namely, a supply of paper sheets of uniform size, a can of "tree tanglefoot," and a two-inch or two and one-half-inch painter's brush. In warm weather the "tanglefoot" can be applied very easily, but in colder weather it may be necessary to warm the material a little. An ample stock of these capture sheets may be prepared in advance and stacked between frames, or the number required for a test may be made up immediately prior to use. The writer finds that he can prepare a dozen sheets in ten or fifteen minutes.

In connection with the operation of the device it is well to record something of the orchard conditions and of the habits of our pest species. During the active season both larvæ and adults feed on the tender shoots or terminals of new foliar growth of the citrus trees, so that during this period infestation is restricted chiefly to this tissue. When these terminals toughen, the insects abandon them. Thus it may be seen that the tender new growth terminal or shoot lends itself well to the purpose of our feeding unit.

The recovery trap is employed in the following manner. A grove is visited in which it is desired to determine the status of the thrips occurrence. Commencing at one corner of the grove and progressing systematically from point to point, the tender terminals are deftly shaken against the trap screen which, with the box, is kept in a horizontal position, the box lid having, of course, been opened. Many parts of the grove are thus canvassed until an adequate number of terminals, usually forty, have been manipulated. The lid is then closed and a return is made to the laboratory.

To facilitate the examination of the trap and the enumeration of the insects, the sticky capture sheet is removed and cut into a convenient number of smaller pieces, usually six. These sections are critically surveyed with a hand lens and the total number of captured individuals is ascertained. This total is then divided by the number of terminals (forty) which yielded the catch, and the resulting quotient represents our ultimate factor—"thrips per terminal."

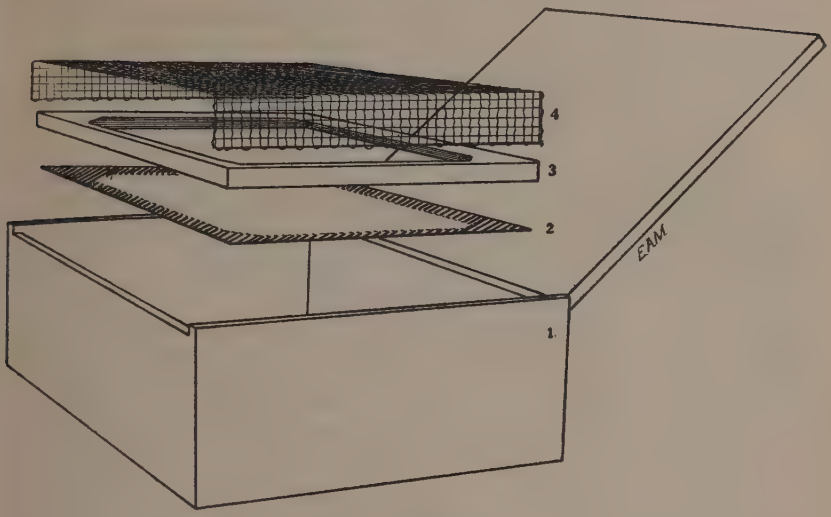
When it is desired to obtain during a given trip, the pest status of several groves, or of several experimental plots in a given grove, this may be done very handily by equipping the recovery trap with one capture sheet for each grove or plot to be scored. This is conveniently done by separating the sticky sheets by means of additional frames (see 3, Figure 1). As the topmost capture sheet is used, it is placed at the bottom of the box, so that when the entire status job is completed the sheets will number from top to bottom in the same order as the collections were made. It is well to number each capture sheet to conform with a notebook legend.

A few suggestions may here be made regarding the general

use of the device herein described. Obviously, it is adapted for use only with species which are external feeders. Boring, tunneling, or excavating insects will not lend themselves to the operation of the pest gauge. It is patent also that attached insects (such as scales, mealybugs, whiteflies, etc., in the immature stages) must be excluded. With these exceptions, the recovery trap should have general application where active phytophagous species are concerned.

In the act of shaking or striking foliage of the host plant against the trap screen there is a chance for the personal element to influence the operation. After using the recovery trap for a short time, however, the operator becomes sufficiently skilled so that each branchlet is handled almost uniformly. We should not fail to mention also that the plant terminal or branchlet is to some extent a variable factor. This, however, is true of any plant unit that may be selected for insect estimates. At most times during the growing season, orange groves possess a certain number of tender new-growth terminals which stand out conspicuously against the background of the older, darker foliage. For the food of the thrips these terminals are the preferred part of the citrus foliage. As soon as they age and toughen a little they cease to contrast with the remainder of the tree and are abandoned by the thrips. These conditions lead to the fact that the terminals most attractive to the thrips are at the same time most conspicuous to the human eye, and thus may be readily detected and employed in our tests. Moreover, of all the twigs in the grove, those above described conform more nearly to one uniform type.

The pest gauge has been in use during two seasons of our citrus thrips studies, and many opportunities have been afforded to observe its merits. Considerable data have been accumulated which indicate that the device possesses real value for scoring varying degrees of pest occurrence. However, on account of the technical importance of the statistical phases of the subject, it has been thought best to give these additional study and to report the data in a second paper. Meanwhile it is possible that other entomologists may test the device and contribute their opinions regarding its value.



E. A. McGregor

Figure showing the assembly of the units of the pest gauge

Interesting Moths from Mill Valley, California

The acquisition of a small week-end cottage in a grove of live oaks and madrones at Mill Valley, twelve miles north of San Francisco, has given me an opportunity to do some moth collecting, mostly at light. The results are worthy of a fuller report, but only a few interesting species need be mentioned here. Of *Matuta quarta* Grote a single specimen was taken, perhaps its first reported capture since its description by Grote in 1881. Several specimens of *Cochisea sinuaria* B. and McD., heretofore known only from Arizona, are among the catch, and two of *Eurotype contadina* Smith were taken on trunks of redwood trees. The taking of *Conistra devia* Grote and *Amphipyra pyramidoides* Gn. seems to extend the known range of these eastern species.—E. P. Van Duzee.

NOTES ON SOME SPECIES OF CERAMBYCIDÆ (COL.) FROM THE SOUTHERN PORTION OF VANCOUVER ISLAND, B. C.

BY G. A. HARDY AND W. H. A. PREECE

The following notes are the results of the authors' joint and separate observations and investigations carried out during the years 1924 and 1925; these have special reference to the host trees of the various species dealt with and to other matters connected with the life histories of such species. No host trees are included, of whose use as such the authors have not obtained indisputable proof at first hand. While it is not contended that the following information is in any way new, it is hoped that it may be of interest to other workers in this group as corroborative evidence if nothing more.

The authors wish to take this opportunity of recording their sincere appreciation of the unfailing assistance, encouragement and stimulation which they have received from Dr. E. C. Van Dyke, to whom must be given primary credit for any information of value which may be contained in the following notes.

ERGATES SPICULATUS Lec.

This species has been found evidently newly emerged under a new railroad tie of douglas fir (*Pseudotsuga mucronata* Raf.).

The tie in question was extensively tunneled, heaps of ejected frass being piled on the ground beneath the cut made in sawing.

OPISMUS QUADRILINEATUS Mann.

Dead specimens and remains have been found at various times at the elliptical burrow exits beneath the bark of dead balsam (*Abies grandis* Lindl.) and dead douglas fir (*Pseudotsuga mucronata* Raf.). More extensive evidence as to the life history of the species was obtained in late December, 1925, when a series of living imagines was obtained from pupal cells in dead balsam.

The larva tunnels in the heartwood at from one-half inch to two or more inches from the surface, the borings as a rule following the grain of the wood. When ready to pupate a perpendicular tunnel about three inches in length is bored out and a horizontal exit burrow is constructed to the inner surface of,

and sometimes partly into, this bark; this tunnel is stuffed with frass. Pupation takes place at the top of the perpendicular tunnel, which is slightly enlarged so as to form a pupal cell.

The imagines emerge from the pupal stage in the latter part of December, remaining in the wood until spring. Very freshly emerged specimens are distinctly sluggish, but those that have fully completed their metamorphosis hurriedly seek refuge down their perpendicular burrows when disturbed. It seems that the perpendicular burrow is cleared of débris by the imago, as these burrows were only clear in the cases where the imagines had evidently emerged some time before, and were full of refuse in the cases of those whose metamorphosis was hardly complete.

RHAGIUM LINEATUM Oliv.

Has been obtained in series from beneath the bark of dead balsams (*Abies grandis* Lindl.).

The larvæ work in the cambium and outer sapwood. Pupation takes place at the end of July and beginning of August in the larva's second summer. When the bark is removed from the trunk, the pupal cell appears as an oval, about twice as long as wide, outlined with frass, the length being determined by the length of the pupa. The depth of the cell which seems to be obtained by gnawing away the inner surface of the bark is only sufficient to enable the pupa to fit snugly between the bark and the wood. Pupation is not usually of more than a month's duration.

On emergence from the pupal stage in late August or early September, the imago commences to gnaw its way through the bark from the head of the pupal cell. It should be stated that the pupa has invariably been found with the dorsal portion against the wood and the ventral against the bark, which position is retained by the imago in gnawing its way out. The imago gnaws upward and outward, forming a conical-shaped chamber in the bark at the head of the pupal cell, in which it hibernates; it finally emerges from the tree in late March or early April, April and May being the months of adult activity in this locality.

XESTOLEPTURA CRASSIPES (Lec.)

Remains have been found at the burrow exit beneath the bark of an old stump of the balsam (*Abies grandis* Lindl.).

The larvæ mine deep within the heartwood, pupating near the surface, exit burrows to the inner surface of the bark having been bored prior to pupation.

The adults are attracted to flowers, but are more frequently found flying amongst low herbage.

LEPTURA DOLOROSA Lec.

A dead specimen was found at the burrow exit beneath the bark of an old stump of douglas fir (*Pseudotsuga mucronata* Raf.).

The adults are most frequently taken in flight, but are also found frequenting the flowers of *Spiræa discolor* Pursh and sunning themselves on large leaves such as those of *Acer macrophyllum* Pursh.

ULOCHÆTES LEONINUS Lec.

Only one tree was found in which the species was present, and that was a dead balsam (*Abies grandis* Lindl.). The portion of the trunk from three to fifteen feet from the ground was literally honeycombed with the larval borings of this species to a depth of some three inches into the heartwood.

The larva prior to pupation bores for some distance perpendicularly, it then turns at a right angle and bores horizontally out to the inner surface of the bark. This done it returns to the angle where the pupal cell is formed, the horizontal boring being blocked with shredded wood, etc., on the return journey. The imago on emergence has its exit ready made, with the exception of the bark through which it has to make its way. July is the month of adult activity.

This interesting insect in many ways bears a striking resemblance to a bumblebee, its appearance and coloration are similar, it has the same kind of blundering flight; the female when handled makes a bluff at stinging with the ovipositor and also emits a bee-like, albeit somewhat faint, buzzing sound. It was not definitely ascertained how the buzzing was produced, though it is believed to have been done by vibrating the wings against the elytra, or possibly through the spiracles as is the case with the Syrphidæ, wings and elytra alike being held at an angle of 45 from the abdomen during the performance.

The ♀ in flight, and sometimes when at rest, carries the ovi-

positor and tip of the abdomen curved up over the back, the ovipositor pointing straight to the front.

NECYDALIS LÆVICOLLIS Lec.

This species has been found breeding in willow and alder (*Alnus rubra* Bong.). The borings, pupal cells, etc., though on a smaller scale, are similar in plan to those of the preceding species, the larvæ riddling the heartwood with perpendicular burrows. July and August appear to be the months of adult activity.

One of the most interesting points observed in connection with this species was the heavy mortality which occurs between emergence from the pupa and exit from the host tree. Some casualties were noticed amongst the willow borers, but they were far more frequent in the cases where alder was the host tree. Counting corpses and borings from which successful emergence had taken place, casualties in alder ranged from 15 per cent or 20 per cent to as high as 75 per cent. From the observations made it would appear that the comparative hardness of wood and bark may have direct bearing on this subject, for the harder the wood was the heavier was the casualty list.

This peculiar beetle is liable to be overlooked on account of its likeness to certain of the parasitic Hymenoptera.

SEMANOTUS LIGNEUS Fab.

This species has been found breeding in the giant cedar (*Thuja plicata* Don). The eggs are laid in crevices of the bark singly or in groups of six to twelve. On hatching, the larvæ at once diverge from each other; the burrows are fairly straight at first, but soon twist and turn, most commonly looping back and forth across the grain of the wood. When full fed the larva dips into the wood, where it forms an elongate pupal cell, parallel to the grain in most cases; it then turns, and retracing its course, bores nearly through the bark, and on finally retreating to the cell fills the exit burrow with frass; pupation is of short duration, taking place in the late summer. On emergence the adult remains over winter in the pupal cell where it is found lying ventral surface uppermost, head toward exit burrow. Pupæ were seen up to the end of August; from then on only adults could be found.

A log which had been stripped of bark in late August was

found on re-examination to have many empty pupal cells, from which the adults had voluntarily emerged, possibly due to the more direct warmth from the sun's rays arousing them to premature activity.

A hymenopterous parasite, *Xorides insulans* Cresson, has attacked this species to a large extent the past season. Judging by the number of parasitic cocoons at the end of the larval burrows in the sapwood, it effects its deadly work before its prey has entered the heartwood for pupation. There is no doubt that the parasite is a most useful check to what otherwise might prove a serious pest.

PHYMATODES DECUSSATUS Lec.

PHYMATODES DECUSSATUS var. OBLIQUUS Csy.

This species and its variety have been found working in dead branches and saplings of garry oak (*Quercus garryana* Dougl.).

A superficial examination shows a number of small elliptical holes in the bark, through which the adults have emerged. A more detailed investigation discloses the fact that the larvæ feed in the sapwood, where they execute winding and tortuous galleries, often so extensive as to completely loosen the bark. When full fed the larva dips abruptly into the heartwood, where it forms an elongate pupal cell, parallel with the grain. Prior to pupation it re-emerges from the cell and continues the exit burrow almost to the outer surface of the bark, which burrow it blocks with frass.

Occasionally a pupal cell is found having two burrows emerging from it, one for ingress the other for egress, a very different arrangement from that above described.

Further investigations may show that one type of cell, etc., is the work of the species, the other type that of the variety. Should this prove to be the case it will tend to show that the variety is a good species.

This species is frequently found in association with *Neoclytus conjunctus* Lec.

PHYMATODES VULNERATUS Lec.

This species has been found breeding in maple (*Acer macrophyllum* Pursh). The habits of the larvæ appear to be similar to those of the larvæ of the species mentioned above. No pupal

cells have been noted with more than one burrow leading into them.

XYLOTRECHUS UNDULATUS (Say)

A dead specimen of this species has been found at the burrow exit under the bark of a dead balsam (*Abies grandis* Lindl.). It is expected, however, that this will be found to be the exception rather than the rule, as the observed habits of the imagines lead one to believe that the douglas fir (*Pseudotsuga mucronata* Raf.). will prove to be the host tree most commonly utilized. We have not, however, as yet obtained indisputable proof of the douglas fir being so used.

NEOCLYTUS CONJUNCTUS Lec.

Dead imagines were taken from under the bark of an oak log in September; for some reason, possibly the prolonged drouth of this year, the bark was dried to such an extent that the insects were unable to gnaw their way through, a factor which seems to be of some importance in the economy of other Cerambycidæ of similar habits, judging from our observations this season. In the present case it was estimated that 3 per cent of the "guests" in this particular log failed to emerge, perhaps from this cause.

From observations carried out it is found that the larvæ feed in the heartwood of the dead branches or trunks, where they execute extensive galleries, to a degree that they are instrumental in causing many branches to fall. Several instances were noted in recently fallen branches that could be assigned to no other cause.

The pupal cell is constructed parallel to the grain and about half to three-quarters of an inch below the surface of the wood; the larva eats an exit burrow from the cell to nearly through the bark, afterward filling it with fine particles of frass. Perfect living adults were dug out of these cells during the middle of November. They were lying in their cells, elytra uppermost, head toward exit, and were very sluggish on removal. The normal period of "adult" activity is April and May; they therefore appear to assume the adult form in early winter, remaining quiescent until spring in the pupal cell.

PLECTURA SPINICAUDA Mann.

This spider-like wingless Cerambycid has been found breeding in maple (*Acer glabrum* Torr and *Acer macrophyllum*

Pursh.), alder (*Alnus rubra* Bong and *Alnus sitchensis* Regel), and willow.

The larvæ make winding galleries in the sapwood, filled with coarse frass; when approaching maturity they dip into the heartwood and form oval cells just below the surface.

The adult on emergence gnaws its way through to the exterior. Some adults emerge in the fall, being taken at large in September and October, and all adults taken from pupal cells during this period were either dead or in process of gnawing their way to freedom. Throughout the winter, larvæ in all stages were found working and pupæ and imagines in the pupal cells, the majority of the latter dead. Adults have also been taken at large in April and May, the months hitherto considered to be the normal period of activity.

The above recorded habits of this most interesting insect lead one to believe that the species may be in a state of evolution or process of adaption to a changed condition of climate. Possibly the species is of boreal origin, where a longer period of development would be required than would be necessary under the warmer climatic conditions pertaining here; perhaps these conditions are causing this species to gradually assume habits similar to those of the closely allied *Ipochus fasciatus* Lec. of southern California.

Synaphæta guexi Lec.

In one case investigated a dead adult was obtained lying in the pupal cell in the heartwood of a willow log; where several well-grown larvæ were observed, the latter were mining in the sapwood, forming long galleries packed loosely with coarse frass. From the structure of the pupal cell it was evident that the larva dipped into the heartwood for a short distance and formed an elongate pupal cell parallel to the grain. The larvæ then filled the ingress burrow with shredded wood, pupating head directed toward it, suggesting that this burrow is also used as the exit by the imago.

Larvæ were in various stages of growth, suggesting a wide range in period of emergence, a conjecture which is borne out by consulting a list of dates of captures which extend from April to October. June and July would appear to be the average time of adult activity.

A NEW FORM OF SABULODES CABERATA GN. (LEPID., GEOM.)

BY WILLIAM BARNES AND F. H. BENJAMIN
Decatur, Illinois

Sabulodes caberata form **cottlei** Barnes and Benjamin, nov.

Head and thorax ochre, more or less tinged with brown. All wings nearly uniformly dark brown, most of the markings obsolete, t. p. line obsolescent, its course as in *caberata*. Veins faintly yellowish. Beneath dark brown; fore wing below vein 2 white, except at tornus; hind wing basally white; all veins marked with white.

A very striking form which may represent a valid subspecies, as Mr. Cottle informs us that no other forms of *caberata* have been captured by him in the same immediate locality.

Expanse: 43-46 mm.

Type locality: San Francisco, California.

Number and sexes of types: Holotype ♂, 2 ♂ paratypes.

Note—We take pleasure in naming this form in honor of the collector, Mr. J. E. Cottle. The holotype is in the Barnes collection, paratypes in collections Cottle and Cassino.

Buprestid Swarming

While the 750,000 barrel storage tank of the Shell Oil Company was burning at Coalinga, California, during this last August, untold numbers of *Melanophila consputa* Lec. were attracted to the neighborhood. These were excessively stimulated by the heat and odor of the burning oil and were flying everywhere, often alighting upon individuals, whom they occasionally nipped. I am told by the oil engineers that this is a common occurrence whenever there are big oil fires. The most interesting fact in this case is that Coalinga is in an arid part of the State, and no coniferous trees, the normal food trees of the beetle, are to be found nearer than from fifty to a hundred miles, so that the beetles not only flew that distance, but were able to detect the odors that far off. Fine particles of oil were carried into the upper air strata and deposited at Dinuba, sixty miles away, so it is not surprising that the more volative principles were carried so far.—Edwin C. Van Dyke.

THE MADRONA APHIS

BY E. O. ESSIG

University of California, Berkeley

Anuraphis madronæ Essig, n. sp.

This new species was collected from the bark of the Madrona,[1] *Arbutus menziesii* Pursh., growing along Cache Creek two miles above Rumsey, California, by J. F. Laniman and the writer, on May 21, 1925. It occurred in small or large, dense colonies on the trunks and larger limbs from the surface of the ground to a height of six or eight feet. At the time the collections were made nearly all of the individuals were apterous, and it was only after a long and arduous search that four alate specimens were taken. The colonies were usually located by following the large numbers of ants which were always present on the infested trees. The writer has had no opportunity to return to the original locality, but has looked elsewhere without securing other material.

Alate (Type): General color a reddish brown throughout, matching to a remarkable degree the color of the reddish bark of the madrona trees. Length of body to tip of cauda, 1.54 mm.; width of thorax. 0.71 mm.; width of abdomen, 0.78 mm. Antennæ slightly longer than the body with many spines; imbricated; length of segments: I, 0.65 mm.; II, 0.78 mm.; III, 0.273 mm.; IV, 0.221 mm.; V, 0.156 mm.; VI, 0.364 mm. (base, 0.091 mm., filament, 0.273 mm.). Sensoria circular, small and large, distributed as follows: III, right 5; left 7, IV, none; V and VI, normal. Rostrum, 3 mm. long. Wings normally veined; front, 2.6 mm. long; hind, 1.5 mm. long; cauda conical; width of base and length about equal; length, 0.14 mm. Cornicles slightly swollen basad of the middle, flaring at tip, slightly imbricated, 0.26 mm. long.

Winged paratypes show the following variations in the number of sensoria on segment III of the antennæ: No. 1, right 11, left 8; No. 2, right 5, left 6; No. 3, right 6, left 5.

Apterous (paratype No. 1). Apparently fully matured, robust. Color same as the winged form. Length, 2.14 mm.; width, 1.49 mm. Antennæ, 1.08 mm.; rostrum, 0.54 mm. Cornicle, 0.35 mm.; slightly imbricated. Cauda, 0.13 mm., same general shape as that of the type.

Type and paratypes in my collection at the University of California.

[1] This plant goes under the various common names of madrona, madrone, madroño.

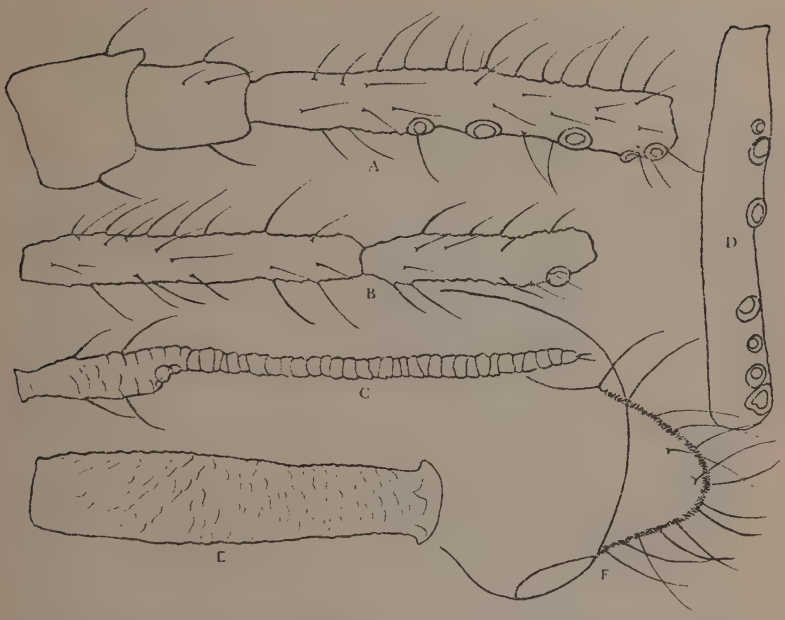


Fig. 1, *Anuraphis madronæ* Essig, n. sp. A, antennal segments I-III; B, antennal segments IV-V; C, antennal segment VI (all of the right member); D, antennal segment III (of left member to show number and arrangement of the sensoria); E, cornicle; F, outline of the cauda and anal plate.

Insects in the Yosemite Museum

During July, 1926, I was given the opportunity of starting a collection of insects for the new Yosemite Museum, and am calling attention to this beginning with the hope that others will add named specimens from time to time as visits are made to the Valley. During the month only the commoner and more conspicuous forms were taken, and these mainly from the Valley floor. Determinations were made from memory and the few books available, and all entomologists are requested to correct errors in naming. In all, 932 specimens representing 199 species and 13 orders were placed in the exhibition cases, besides a number of mounts in the forestry exhibit.—E. O. Essig.

INSECT ENEMIES OF THE CODLING MOTH IN THE VICINITY OF VENTURA, CALIFORNIA

BY STANLEY E. FLANDERS
Saticoy, California

During the four years that codling moth investigations have been carried on by the Saticoy Walnut Growers' Association the following parasites and predators have been observed:

Ichneumonidæ: *Ænoplex carpocapsæ* Cush.
Ænoplex plesiotypus Cush.
Ænoplex n. sp.
Ephialtes sanguineipes (Cr.)
Exetastes n. sp.
Chalcididæ: *Trichogramma* sp.
Prospaltella sp.
Tachinidæ: *Lixophaga* n. sp.
Cleridæ: *Cymatodera angustata* Spin.
Cymatodera ovipennis Lec.
Hydnocera scabra Lec.

Those that function most prominently as natural checks are the species of *Ænoplex* and *Trichogramma.*

Ænoplex attacks the hibernating larvæ. It is most active during October and November. At Carpinteria 20 per cent of 800 larvæ found in bands on the walnut trees were parasitized. On October 24, 1925, the band on a large crabapple tree at Saticoy contained thirty-two larvæ; of these twenty-two were parasitized. A half-grown larva of *Ænoplex* was found feeding on the codling moth as late as February.

The cocoons constructed by *Ænoplex carpocapsæ* at Saticoy were pure white and those of *Ænoplex* n. sp. golden brown, while the cocoons of *Ænoplex* sp. at Carpinteria were black.

A common secondary attacking *Ænoplex* is *Dibrachys boucheanus* Ratz. As many as fifteen have been reared from one larva.

The life-cycle from egg to adult for fifty males of *A. carpocapsæ* in the insectary averaged forty-six days. The lengths of the different stages were as follows:

Egg stage, 3 days.
Feeding stage, 10 days.
Resting stage, 8 to 35 days.
Prepupal stage, 3 to 4 days.
Pupal stage, 11 to 16 days.

A female of *A. carpocapsæ*, confined in a battery jar with codling moth larvæ in cocoons, stung 107 of them, but deposited eggs on forty-eight only.

In the spring of 1926 the cosmopolitan egg parasite *Trichogramma* sp. was abundant and functioned effectively as a natural control. During May and June codling moth eggs were collected weekly from certain trees scattered throughout the Saticoy district. From twenty-five of these trees 2610 eggs were collected. Of these 571 were found to be in the black shell condition which is characteristic of the parasitized egg when the parasite is in the prepupal or pupal stage. Since the eggs were collected each week, many parasitized eggs were not recorded as such because the black shell condition is not reached until about six days after the egg is first parasitized. On one of the trees 227 of the 454 eggs counted on the nuts and leaves were parasitized.

It is estimated that at least 50 per cent of all the eggs deposited during May and June were parasitized.

A common enemy of the moth at Carpinteria is the large brown clerid *Cymatodera angustata*. On ninety trees 200 of these adult beetles were found under the bands. A number of the cocoons of the moth were found which had been penetrated by the beetle larvæ and the contents devoured. At Saticoy the most effective predator of the hibernating larvæ seems to be the little gray clerid, *Hydnocera scabra*.

Although the codling moth was first noted on the apple trees in Ventura County in 1890, natural checks are present and are of inestimable value.

The insects noted were identified by the specialists, R. A. Cushman, J. M. Aldrich, A. B. Gahan, and E. C. Van Dyke.

Typhlocyba vs. Eupteryx

In the Proceedings of the Biological Society of Washington, Vol. XXXI, p. 112, 1918, Mr. McAtee claims that the Curtis paper in the Entomological Magazine in which genus Eupteryx was founded was published earlier than that by Germar in which Typhlocyba first appeared, and his arguments seem conclusive. I studied Germar's paper in Silbermann's Revue carefully when preparing my catalogue, but have not now access

to a copy so will make no attempt to settle the question of priority between these parallel genera of Germar and Curtis now, but wish merely to call attention to two references not mentioned by McAtee, but perhaps equally convincing on the other side. One is Curtis' own remarks to Pl. 633 of his British Entomology in which he states that "my genus Aphrodes comprised two groups, one of which had been *previously* established under the name of Acucephalus by Germar" (italics mine). I take this to be a direct admission of the priority of Germar's names in the paper referred to, including Typhlocyba, and it was this admission that decided me, in the face of Kirkaldy's investigations, to adopt the Germar names. An additional argument of some weight is included in the very note quoted by McAtee to fix the date of the Curtis paper. To that note the editor appended a reply to "Delta" in which he states that a correspondent signing himself XYZ says "that every genus, excepting Paramecosoma, described in the article alluded to (XIX, p. 186) has been *previously* characterized" (italics again mine), and as Eupteryx is one of these previously characterized genera we can pretty safely assume that he referred to the Germar genera as these earlier genera. Both these quotations, especially the first, require careful analysis before we accept the Curtis names. Until such a study has been made I shall continue to use the Germar names in preference to those of Curtis, as I have done in the past.—E. P. Van Duzee.

Notes

Dr. and Mrs. E. C. Van Dyke have returned from a two months' collecting trip through Colorado with stops at Salt Lake City, Utah, Santa Fe, New Mexico, and Grand Cañon, Arizona. With his usual generosity, he has turned over to the Academy his entire catch of several thousand insects taken on this trip, and they are now being mounted. It is too early to report on this material, but it includes such rare forms as *Cychrus hempeli, snowi* and *coloradensis*.

This spring Mr. J. O. Martin spent a week or two collecting in the White Mountains in Inyo County, California. The insects taken, all of which he has presented to the Academy, include a very large proportion of forms new to the Academy collection, and have proven most acceptable additions.

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E. P. VAN DUZEE, Editor F. E. BLAISDELL, M. D., Treasurer

EDITORIAL COMMENT

At a meeting of the Publication Committee of the Pacific Coast Entomological Society, held August 21, 1926, Dr. Stanley B. Freeborn was appointed treasurer of the Pan-Pacific Entomologist, and beginning January 1, 1927, will attend to this department of the Society's activities. Dr. F. E. Blaisdell will continue to act as treasurer until the date named, after which he wishes to be free to take a well-earned vacation. Correspondents will kindly notice the change in the treasurership after January 1.

About two years ago the large collection of insects accumulated by the late Albert Koebele was placed in the care of the California Academy of Sciences for safekeeping, pending its final disposition. Mrs. Koebele has now most generously presented this collection to the Academy under similar conditions to those under which the Academy accepted the Van Dyke and Blaisdell collections. Certain groups in the Koebele collection, including the Coccinellidæ, and parasitic Hymenoptera, are reserved for disposition by Mr. W. M. Giffard of Honolulu, all the rest coming to the Academy of Sciences. Each specimen in this collection will have attached a label reading "Koebele Collection," and their permanent preservation here will constitute a lasting memorial to the entomological industry of Mr. Koebele. For many years Mr. Koebele was connected with the insect control work of the State of California, the United States Department of Agriculture, and the Hawaiian Sugar Planters' Association, in which connections he traveled widely in search of insect predators and parasites, and it was largely through his efforts that the enemies of the cottony cushion scale were brought to California and of the sugar-cane leafhopper to the Hawaiian Islands. Mr. Koebele had a remarkable faculty of

locating the controlling enemies of such injurious insects, and his efforts covered many destructive forms other than those mentioned above. The material forming this collection was acquired, not only about his home in Alameda, California, but in other places where he carried on his investigations, such as Easton, Washington; Plumas County, California; Nogales, Arizona; Washington, D. C.; and in Florida, Australia, New Zealand, Fiji Islands, Japan, etc.

The California Academy of Sciences, and the entomological world as well, is also under obligations to Mr. W. M. Giffard of Honolulu, not only for his help in the final placing of this most valuable collection in the Museum of the Academy, but also for its care and preservation during the years when Mr. and Mrs. Koebele were detained in Germany by war conditions.

Through the generosity of its friends, the Department of Entomology of the California Academy of Sciences has recently received some other notable additions to its collection. Principal among these is a series of 567 sphinx moths from the duplicate material in the Hill Museum, kindly presented to the Academy by Mr. B. Preston Clark of Boston, Massachusetts. After the incorporation with these of the sphingid material already in the Academy the collection now contains 265 species or named varieties, represented by nearly 1000 specimens in this most interesting family of moths. From Dr. William Barnes has been received a considerable series of characteristic moths compared with types in the Barnes and other collections which will be of great value to students of these insects in the West. Doctor Barnes has also sent the Academy a paratype of the new *Coloradia davisi* B. and B., and a specimen of *Cercyonis sthenele* Boisd., the latter probably the only specimen on the west coast of this very rare California wood nymph, which is supposed to have become extinct more than thirty years ago. Dr. H. E. Burke has recently given the Academy a pair of topotypical *Buprestis fremontæ* Burke, following the gift by Mr. R. D. Hartman of a fine example of *Trachykele hartmani* Burke. Another valuable recent addition is a series of paratypes of sixteen species of Perditas received from Mr. P. H. Timberlake.